SYNOPSIS

'Design, Synthesis, and Biological Activities of Schiff Base Ligands and Their Simple and Mixed Ligand Complexes of Transition Metals'

SYNOPSIS SUBMITTED TO

SWAMI RAMANAND TEERTH MAHARASHTRA UNIVERSITY

VISHNUPURI, NANDED 431606

To be submitted in front of RRC

For the Degree of

Doctor of Philosophy (Ph.D.)

In

Chemistry

Under the Faculty of Science

By

Mr. Vaibhav A. Mane

M.Sc. Chemistry (NET-JRF)

Research Scholar

Department of Chemistry

NES, Science College, Nanded

Under the Guidance of

Dr. Deelip K. Swamy

M.Sc., Ph.D., NET

Head, Department of Chemistry

Pratibha Niketan College, Nanded

Email:

Contact no.

Feb-2016

SYNOPSIS

1. Abstract of proposed work plan /problem.

Schiff bases are versatile ligands which are synthesized from the condensation of an amino compound with carbonyl compounds. These compounds and their metal complexes are very important as catalyst in various biological system, polymers, Dyes, and medicinal and pharmaceutical fields.

This project was aimed at the synthesis of some Schiff base compounds and their transition metal complexes of biological significance. Present Investigation which includes some of the new aspects not covered so far. Recently x-ray studies and spectral studies confirmed Schiff base ligand, this led us to carry out the complexation of the above ligand with some metal ions.

We propose the title as" **Design, Synthesis and Biological Activities of Schiff Base Ligands and Their Simple and mixed ligand Complexes of Transition Metals"**

2. Review of literature and development in the subject (previous work done in the relevant area)

Partially filled d-block metal ions produce metal ion complexes, when they react with complexing agent at a specific pH and different reaction conditions. The co-ordination chemistry of transition metal ion complexes has importance in the various fields. There are no. of chelating agents; among them are Schiff bases having greater contribution in the development of coordination compounds. This fact is supported by no. of publications in this field.

Schiff bases can be synthesized from an aromatic amine and a carbonyl compound by nucleophilic addition forming a hemiaminal, followed by a dehydration to generate an imine. Schiff bases form an important group of compounds in chemistry not only because of their useful physical and chemical properties and large number of reactions they undergo but also because of their wide use in industry and their interesting pharmacological activity.

Formation of Schiff Bases

In general, a Schiff base can be prepared as follows:

Some Schiff base complexes with two bidentate or one tetradentate ligands exhibits spin equilibria in solution. Properties of Schiff bases and their metal complexes have been identified by various

scientists in the past and also lots of work is going on to identify unique properties of these Schiff bases.

Major focus was given on biological activity of Schiff base, Transition metal complexes with oxygen and nitrogen donor Schiff bases are of particular interest because of their ability to possess unusual configurations, structural liability and sensitivity to molecular environments.

Schiff bases could be bidentate, tridentate, tetradentate, polydentate ligand capable of forming very stable complex with transition metals. Schiff bases have a very wide variety of applications in many fields.eg. Biological, inorganic and organic chemistry.

Considering the importance of metal ion complexes the researcher of inorganic chemistry or organic chemistry is synthesizing large no. of metal complexes. The organic scientists are synthesizing the various new organic compounds having complexing tendency and co-ordination chemists are trying to find out ability of the newly synthesized organic compounds as a complexing agent.

Mixed ligand complexes play key role in biological environmental systems and also acts as active catalyst in reactions of industrial importance. Mixed ligand complexes are found to be more active biologically than the ligand itself and its binary complexes. They are used in fighting microbial infections.

3. Objectives of research/proposed hypothesis:

i. Synthesis of Schiff base ligand and their metal complexes

ii. Characterization of Schiff base ligand and their metal complexes

iii.Biological activity of Schiff base ligand and their metal complexes iv. Study of structural activity of complexes

4. Methodology to be adapted:

i.Synthesis of organic chelating agent will be carried out in laboratory

ii.Characterization of chelating agents will be carried out by physical, chemical parameter as well as spectral studies

iii.The characterization of synthesized chelates will be carried out by physical, chemical methods, TGA, DTA, X-ray,E.S.R, magnetic susceptibility and spectral studies as well as spectral studies

5. Importance of study/Society applications:

International status:

Metal complexes of Schiff bases have been extensively used in various fields such as in pigment and dye-stuff industries due to the variety of coloured transition metal complexes and also in polymer industry, textile industry, rubber industry etc. The Schiff base complexes with cobalt are used as catalysts for the selective oxidation of phenols by dioxygen to quinols or quinones in good yield

Biological applications the metal complexes of Schiff bases have been studied mainly for their fungicidal and insecticidal activity. The transition metal complexes of some Schiff bases containing sulphur are reported to show anticancer and antitumor activity.

National status:

1. Schiff base complexes are known to be medicinally important and used to design medicinal compounds.

2. In recent year the co-ordination chemistry has gain much importance in the bioorganic and bioinorganic reaction. The study of complexes has attained considerable interest among coordination chemists due to the biological importance in the living system.

3. Many of the Schiff base complexes has catalytic activity as well as used in Dyes.

Significance of the study:

It is well known that all the synthesized complexes show better activity than ligands due to coordination. Literature survey indicates that organic compounds having chelating tendency and metal chelateshasantimicrobial, antifungal, antibacterial, insecticidal, herbicidal, pharmaceutical agents.

6. Proposed work plan/formulation and structure of study:

Year wise plan of work and targets to be achieved.

Proposed plan for Ist year:

a) Survey of literature

b) Synthesis of complexing agents

Proposed plan for IIndyear:

c) Characterization of metal ion chelates by physical, chemical methods and spectral

Study.

d) Synthesis of metal ion chelate.

Proposal plan for IIIrd year:

e) Characterization of metal ion chelates by physical, chemical methods and spectral study.

f) To study biological activity of the prepared metal complexes.

g) Research paper communication to National and international journals.

7. References:

1. Mahasin Alias, Huda Kassum, and CarolinShakir, J. of association of Arab University basic und applied sciences. 15,28-34(2014)

2. Yakup BARAN, BirgijlERK ,Trends of chemistry. 20 312-317(1996),

3. Kiran Singh, Yogender Kumar, ParveshPuri, Chetan Sharma, Kamal Raj Aneja. Arabian J. of Chemistry (2013)

4. Pratibha Mittal, V. Uma, K.G. Ojha ,palagiaresearcg library.1(3):146-156(2010).

5. Zaki N. Kadhim). Mater. Environ Sci.(3)693-698(2015)

6. Anantprakash, DevjaniAdhikari, International J. of chem.Tech Research vol.3 no.4, pp18911896(2011).

7. Richard M. Moutloali, Funzani A. Nevondo, James Darkwa,J. of Organometallic chemistry 656,262-269(2002).

8. R. Sellappan, S.prasad, P.Jayaseelan and R. Rajavel, RASAYAN J. Chem.. vol.3, No.3(2010), 556-562.

9. Yasuhiro Inada, Koji Mochizuki, Takashi Tsuchiya, Hiroaki Tsuji, InorganicaChimicaActa 358,3009-3014(2005).

10. Vimal Patel, Pranav Trivedi, HardikGohel, DishaKhetani, Int. J. of advances in pharmacy, biology and chemistry-vol.3(4),(2014).

11. S.R. Kelode ,J. of chemical and pharmaceutical Research5(7), 100-103(2013).

12.DrNavneet Kumar, 2Pratima Sharma*, 3Astha pareek, International Journal of Applied Research & Studies.

13.R.R. JHA and mukharjee, A. Asian J.of chem. Vol.19 No.1(2007)641-646)

14.H. Tazoki and K. Miyano, J. Am. Chem. Soc.,1959,9769.

15. DN Roberston, U.S.P., 1960,2,920,101.

16. R.L. Dutta and Md. M. Hossain, J.Science. Ind. Res.,44,635, 1985.

Signature Research Scholar — Signature Research Guide

Mr. Vaibhav Anandrao Mane — Dr. D.K. Swami